HIMALAYAN MUSK - HUNTING AND TRADING

by

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A report submitted to the Wildlife Trade Monitoring Unit,

a Specialist Group of the Survival Service Commission of the International Union for the Conservation of Nature and Natural Resources,

on the occasion of the

III Meeting of the Conference of the Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora

held in New Delhi from 25 February to 6 March 1981

World Wildlife Fund
Project No 1328
Himalayan musk deer, India
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INTRODUCTION

The term musk is loosely applied to include a number of animal and vegetable products having a musk-like scent. Many of these are listed by Chopra et al (1958). Correctly used, the word refers specifically to the secretion of the male musk deer, Moschus sp., which emanates from a gland situated anterior to the sexual organ.

For centuries musk has been used in cosmetics and medicines. Traditionally, the animal is killed to extract the musk gland. However, Flerov (1952) noted that, "It is not necessary to kill the animal in order to obtain the musk. To remove the musk from the bag it is only necessary to put a tube into the aperture, when a stream is excreted by slight pressure on the bag." Using a similar method, the Chinese annually extract musk from captive animals (Bista et al 1979).

Musk occurs in all species or races of Moschus but the quantity and quality is variable. Owing to present confusion which surrounds taxonomy of the genus Moschus, discussed elsewhere (Green and Singh in press), it is simpler to refer to the Himalayan musk deer by its vernacular rather than scientific name. However, it should be mentioned that the Himalayan species was originally classified as M. chrysogaster chrysogaster Hodgson, 1842 (Flerov 1933) and later changed to M. moschiferus moschiferus Linnaeus, 1758 (Flerov 1952). Although the latter scientific name is more commonly used for the Himalayan musk deer, it is least likely to be correct (Groves 1982, Gannikov et al in press).

Distribution of the Himalayan musk deer extends from Pakistan eastwards, through N. India, Nepal and Bhutan, as far as Burma and incorporates parts of S.W. China and Tibet. This range equates to the distribution of M. chrysogaster described and mapped by Flerov (1952). Widespread hunting has reduced populations to isolated pockets in Nepal and resulted in the near extermination of the species in India (Jamwal 1972). Whilst it was recognised as 'threatened' (Holloway 1973), the Himalayan musk deer was registered as 'vulnerable' in the Red Data Book (IUCN 1978).

As part of the threatened deer programme of the International Union for the Conservation of Nature and Natural Resources (IUCN), World Wildlife Fund Project 1328 (Himalayan musk deer, India) was launched in 1979 with the co-operation of the Government of India. The project is based in the Kedarnath Sanctuary, Uttar Pradesh, where an ecological study is underway to identify the conservation requirements of the species. In the pursuit of this objective certain information about hunting and the musk trade has come to light, details of which are submitted in this report.

MUSK GLAND

Known as a 'pod' in the trade, the musk gland of mature males is about 6 cm long, 3 cm in diameter and 4-5 cm deep (Flerov 1952). It comprises a sac, produced by an infolding of the skin, into which the musk is secreted from alveoli lining the inner wall. The external opening, through which the musk is discharged, lies about 1 cm in front of the preputial orifice (Wallis 1951). The biological role of musk is uncertain but Bannikov et al (in press) suggest that it is used as a scent for marking territories.

The gland contains up to 45 g of musk, a pungent, red-brown, viscous substance which darkens and becomes unctuous on drying. In juvenile males (less than two years old) the musk is milky in colour and texture and does not exceed 5 g (Flerov 1952). In old males it seldom amounts to more than 3 g (Mukerji 1953). The suggestion that musk is only secreted during the rut (e.g. Blanford 1888, Chopra et al 1953, Primek 1974) is misleading because there are records of musk deer with full pods having been shot in other seasons (Pokrovsky 1956, Yaroshnikov 1956). However, poachers do not restrict their hunting activities to the rut but operate all year round, if climatic conditions permit. Evidence (cited in Appendix 1) also shows that pods are fullest in the rut (Bannikov et al in press). Data on the quantity of musk in pods vary widely, from [illegible] g to 45 g (Mukerji 1953).

Average pod weights, according to various sources, are listed in Table 1. The figures quoted by Blower (1974) appear to be high; moreover, they contradict other information to the effect that pods from Nepal are only one third the size of those from Tibet (Matheson 1950,

Table: 1 Average weights of musk pods originating from various regions of the Himalaya

Region	Average pod weight		Reference
N. India	1 oz	(28 g)	Jerdon 1867, Lydekker 1898
N. India		24 g	Mukerji 1953
Garhwal	2 tola	(23 g)	Atkinson 1882
Garhwal		20-30 g	unofficial 1979
Nepal	4-5 tola	(46-58 g)	Blower 1974
Nepal		20-30 g (nearer 20 g)	unofficial 1980
Tibet	3 tola	(35 g)	Blower 1974

Note: 1 oz = 28.35 g; 1 tola = 11.63 g

Wallis 1951). Previously 3 tola (35 g) was considered to be the average weight of a pod (Green 1978) but, in view of more extensive data (Table 1), 25 g seems to be a more realistic figure. Average pod weight provides a valuable means of estimating the number of musk deer killed, based on quantities of musk traded.

QUALITIES OF MUSK

Muscone, a ketone, is responsible for the scent of musk. It was first isolated by Ruzicka in 1926 and constitutes 0.5-2.0 % of musk (Matheson 1950). According to Klepov (1948) there are two principal qualities of musk:-

1. Tonkin, Tibetan or Oriental is the best and higher priced musk. It comes from M. moschiferus which occurs in the Himalaya, S. Tibet and parts of S.W. China (Szechuan). Before World War II it constituted 50 % of European imports (Matheson 1950). The best variety of tonkin musk is termed 'blue skin' on account of the metallic-blue hue of the inner membrane of the pod, through which the dark brown granules of musk are visible. Good pods weigh 25-4[illegible] g (Wallis 1951).

2. Siberian or Kabardinic musk is lower priced. It is obtained from M. sibiricus which is found in the Altai, Sayan, E. Siberia, Sakhalin, N. Mongolia, Korea and N.E. China. Most used to be exported to Japan but a little found its way to London (Wallis 1951).

Musks from Yunan, Assam and Nepal are essentially varieties of tonkin musk and are nearly as valuable (Matheson 1950, Wallis 1951). Assam musk is

black and Nepal musk is red-brown when dried.

Three varieties of musk are recognised within indigenous medicines of India: kamrupa, nepala and kashmira (Chopra et al 1958). Kamrupa is black and the most superior in quality. As it used to be imported from China and Tibet it must have equated to tonkin musk.

PREPARATION, ADULTERATION AND TESTING OF MUSK

The moisture content of fresh musk is 30-40 % (Bista et al 1979). After removing the musk gland from the animal, the pod is dried by placing it in the sun for several days or over a heated stone for a few hours. Musk should then be stored in hermetically sealed containers to minimize diffusion of the scent.

Pods are sold to the dealer in a dried condition. Thereafter, musk tends to be traded in granular rather than pod form. About 50 % (Wallis 1951) or 60-70 % (unofficial source) of granular musk is derived from the pod. Western perfumers, however, only buy musk in pod form as a slight safeguard against adulteration.

Musk is adulterated at all levels of the trade. In Garhwal, Uttar Pradesh, it is usual practice for poachers to add dried blood, blood vessels and lead shot to the pod, thereby increasing its weight by 1, -1.0 tola (5-20). Many other organic and inorganic substances are used as adulterants, including liver, cereal grain and beans (Chopra et al 1) and stones and earthy matter (Wallis 1951). Sometimes synthetic musk is added to the adulterants. In Indi musk is adulterated to such a free extent that Western perfumers obtain their supplies from Nepal.

There is no scientific method for checking the purity of musk, except in Japan where the muscone content is measured. In Europe perfumers judge the purity of musk by its appearance, scent and soft, palpable nature. In India various crude tests in vogue among pharmacists include:-

1. Solubility - musk is 5-7 % soluble in water (Ruberti 1971) and loses its odour on dissolving. Adulterants tend to be insoluble or may impart a bad odour to the solution.

1953) and whitish (Wallis 1951). Earthy adulterants increase the ash content and the ash of dried blood is red-brown (Wallis 1951).

USES OF MUSK

Cosmetics

Musk is esteemed in perfumery for its fixative and scent properties. The first artificial musk, musk xylol, was patented by Albert Baur in 1888 (Matheson 1950). Since then the synthesis of over 80 artificial musks (Whiting 1975) has largely replaced the use of natural musk in cosmetics. In Europe a few exclusive perfumers still require natural musk for some of their traditional perfumes.

According to M.G.J. Beets (1978, pers. comm.) and G.H. Dodd (1980, pers. comm.), who are eminent scientists within the field of perfumery, natural and synthetic musks are chemically indistinguishable. The view, held by some perfumers, that synthetic musks do not equate to the natural substance is based on artistic rather than scientific principles. Continued use of natural musk in cosmetics is a luxury, therefore, which can only be afforded at the risk of destroying a species.

Medicines

Nowadays most musk is used in medicines. In China musk deer are farmed for their musk which is extracted annually and subsequently used for medicinal purposes (Sista et al 1979). The majority of Himalayan musk is imported to Japan for use in medicines.

In India musk still is used within the ayurvedic and unani systems of indigenous medicine. Over 100 ayurvedic and 95 unani preparations contain musk (e.g. Sista 1978, pers. comm.) which is alleged to be a cardiac, circulatory, respiratory and sexual stimulant. Musk is used as a sedative in the treatment of epilepsy, hysteria, asthma and other nervous disorders and as a stimulant to cure pneumonia, bronchitis, typhoid, typhus and cholera (Chopra et al 1958, Mukerji 1965).

Experiments suggested by Chopra et al (1958) to verify the

authors conclude that, "the importance of musk in the indigenous medicine in India has been very much over-rated and ... it has not got any marked physiological or therapeutic properties." A similar remark is made by Hoerr and Osol (1952), "The actions of musk ... are so slight that they would not produce any therapeutic effects." The continued, widespread use of musk in medicine merits further scientific research into its alleged curative properties (Green and Singh in press).

METHODS OF HUNTING MUSK DEER IN THE HIMALAYA

Poaching is highly organized and conducted surreptitiously except in very remote areas, such as Namlang Valley in W. Nepal (Jackson 1979), which are safe from policing. In Garhwal poachers hunt in parties of 6-9 men, of whom 3-4 are armed with guns. Hunting trips last for 7-9 days during which time up to 3 pods might be obtained. Parties operate all the year round, frequenting the higher, remoter areas in summer and the lower valleys in winter. Earnings average I.C. Rs 50,000-60,000 per month and are distributed equally among members of the party, with the exception that marksmen hold two shares. Food supplies are carried up to pre-arranged dumps by local villagers. Such persons also provide the poachers with the latest information about the movements of wild life [illegible] may be kept hidden in the forest or accompany the poachers when they travel by night to a venue. From here the party [illegible]

[illegible] methods employed in different regions of the [illegible] [illegible] able 2 and described below. The use of birch [illegible] [illegible] call of young musk deer (Pleroy 1963) is not [illegible].

[illegible]

[illegible] India (Kashmir, Himachal Pradesh, Uttar Pradesh [illegible] due to the ready availability of guns. However, [illegible] advantage in less remote areas because their noise

Table: 2 Methods of hunting musk deer in different regions of the Himalaya

Hunting method	Region	Reference
Shooting with guns		
- after noisy drives	N. India	Lydekker 1898
	Kashmir	A.J. Gaston 1978, pers. comm.
	Garhwal, U.P.	this report
	Kinnaur, H.P.	Forest Department
	Langtang, Nepal	Green 1980
- after chase by dogs	Garhwal, U.P.	this report
	Nepal	Jamwal 1972
	Sikkim	P.O. Pazo 1980, pers. comm.
Fence and snares		
	N. India	Lydekker 1898
	Garhwal, U.P.	Atkinson 1882
	"	Lydekker 1900
	"	this report
	Kinnaur, H.P.	Forest Department
	Arun Valley, Nepal	McNeely 1973
	Langtang, Nepal	Green 1978
	Sagarmatha, Nepal	J.W. Jerram 1979, pers. comm.
	Sikkim	P.O. Pazo 1980, pers. comm.
	Bhutan	unofficial 1980
Poison		
- food	Nepal	Jamwal 1972
- spears	Namlang Valley,Nepal	Jackson 1979

may be heard and reported to the relevant authority. In Garhwal this is the reason why poachers are tending to resort to the fence and snares method of hunting. In Nepal, Sikkim and Bhutan the use of guns is limited because they are not easily available.

Hunting with guns requires 4-5 men to drive the musk deer uphill, out of the forest or scrub, towards the alpine pastures and cliffs where 2-4 marksmen are posted. Noises are made by shouting and/or clapping the hands to help flush animals from their resting places. Out of every 10 musk deer shot about 4 prove to be mature males bearing full pods.

Dogs, specifically trained to track musk deer, are occasionally used. The musk deer are chased until, exhausted, they retire to the safety of a cliff ledge from where they are shot.

Fence and snares

Hunting by this method is most commonly practised in Nepal, [illegible] fences, stretching for several kilometres, are made

from brush-wood, sufficiently high (1 m) to discourage musk deer from jumping them. Gates, located at 10-30 m intervals, are fixed with sprung nooses, designed to ensnare the animal by its foot or neck. Traplines contour the sides of a valley, just below the upper forest or scrub limit, and are intersected by others which run through the vegetation, parallel with the direction of slope. When viewed from the opposite side of a valley, the fences are clearly visible as dark wavy lines which contrast sharply against the background vegetation. Once the snares are set a drive may be conducted. Subsequently the traps are inspected every few days. Frequent checking minimizes the chances of trapped animals being removed by predators. As many as 100-600 snares may be set per one kilometre length of valley. This gives some idea of the intensity of hunting by such a method (Green 1978). According to Whiting (1975), 200-300 snares provide 3-4 musk deer annually.

In Sikkim the snares are made from ex-army telephone wires. In 1977-78 the Forest Department mobilized 150 men to demolish 175 km of traplines (P.O. Pazo 1980, pers. comm.). Poachers in Bhutan use relatively sophisticated western mountaineering equipment, including nylon rope for making the snares. It is thought to originate from Kathmandu.

Poison

The use of poisoned spears, strategically placed beside defaecation sites or below ledges frequented by musk deer, is well documented by Jackson (1979). The animals are driven towards the traps by setting fire to the alpine pastures. In the two month hunting season of 1976-77 [illegible] tola of musk were obtained from [illegible] animals. Based on an average pod weight of [illegible] g (this paper), the ratio of mature males to total musk deer killed is 1:4. Hunting by this method is probably uncommon because it is not reported elsewhere in the literature.

[illegible] mentions the widespread use of a poison in [illegible] which is applied to the leaves of *Skimmia laureola*, supposedly a favourite [illegible] of musk deer. [illegible]

there are no other records of this hunting method being used in Nepal. Moreover, recent research does not indicate that this plant species is eaten selectively by musk deer (Green unpubl.).

PRICES OF HIMALAYAN MUSK DURING THE LAST CENTURY

Before the beginning of the twentieth century musk was worth half its weight in gold (Rockhill 1891); by the mid-1970s it fetched four times its weight in gold (Blower 1974). Prices of musk originating from various regions of the Himalaya are given in Table 3 for the last 100 years or so. Selling prices of musk at different levels within the

Table: 3 Prices of Himalayan musk during the last century

Year	Origin	Price of musk			Reference
		Whole-sale	Retail Rs/10 g	Export /10 g	
1662	(U.K.)			£ 0.4	Matheson 1950
c. 1867	N. India	20-30			Jerdon 1867
1878-88	N. India		8.9		Chopra et al 1958
c. 1882	Garhwal	10-15			Atkinson 1882
c. 1884	N. India	15-20			Sterndale 1884
c. 1891	Tibet ?	40			Rockhill 1891
c. 1947	?			US $ 12.4	Harris 1947
> 1948	(U.K.)			£ 1.4-4.6	Matheson 1950
1957	Garhwal	50			unofficial 1979
1970-71	Uttar Pradesh	150			[illegible] pers. comm.
1972	Nepal	200			Jest 1974
1972-73	Nepal		1036.6		Lower 1974
Post-prohibition of the musk trade in India and Nepal					
1974	Nepal	350-500	1030-2150		Lower 1974
1976	(Japan)			Yen 49223	Wildlife Trade Monitoring Unit
1977	Nepal	1200	2400		Jackson 1979
1978	Kashmir	1500			S.J. Gaston 1979, pers. comm.
1979	India		2000		The Hindustan Times 16.11.79
1979	Garhwal		2500		unofficial 1980
1979	(France)			US $ 450.0	unofficial 1979
1980	(France)			US $ 400.0	unofficial 1980

Notes: 1. wholesale prices are quoted in Rs/tola (1 tola = 11.67 g).
2. The price of musk originating from Indian regions is given in Indian currency; that from Nepal is given in Nepalese currency.
3. In the case of export values of musk, the importing country is given in brackets.

trade are quoted where data are available. Wholesale and retail values [illegible] musk is sold by the poacher and dealer, respectively.

The export price equates to the value of musk on the international market. A number of conclusions may be drawn from Table 3, despite the paucity of data:-

1. In the first half of this century there probably was little difference between wholesale and retail prices of musk within the Indian subcontinent. Musk exported to the West was not appreciably more expensive.
2. The musk trade became highly lucrative business in the second half of this century. The price of musk increases significantly every time it changes hands.
3. The value of musk began to increase exponentially in the 1960s, presumably as a result of diminishing populations of musk deer and a growing demand for the commodity.
4. After the prohibition of the trade in India (1972) and Nepal (1973), musk continued to be traded on the black market and, consequently, its price escalated further.

In Table 4 are shown the annual quantities and prices paid by a state pharmacy in Uttar Pradesh for musk originating from Garhwal. For comparative purposes, the prices at which musk was being sold by poachers in Garhwal are given alongside. Again these data illustrate the rise

Table: 4 Wholesale and retail prices of musk originating from Garhwal

Period	Wholesale Rs/tola	Retail Rs/10 g	Quantity g	Profit margin
19[illegible]-[illegible]	125	[illegible]	10[illegible]	[illegible] %
1970-71	250	[illegible]	[illegible]	12 %
1971-72	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	
1[illegible]-[illegible]	480	[illegible]	1,250	[illegible] %
[illegible]-[illegible]		[illegible]	600	
1974-75	[illegible]75	[illegible]6	700	-26.9
1975-76	1,800	500	[illegible]00	-[illegible] %
1976-77	?	-	0	
1977-[illegible]	2,200	-	0	-43 %
1978-79	?	1,[illegible]50	[illegible]	
mean			[illegible]	

[illegible]fold in the price of musk following the prohibition of the trade, although a [illegible]-year time lag is apparent. Surprisingly, the dealer's profit [illegible] have fallen progressively, to a point where musk was [illegible] in the second half of the decade - a most unlikely [illegible]

being adulterated to an increasing degree. This conclusion is endorsed by the pharmacist who claimed that the purity of musk had deteriorated to an extent that supplies probably only contained 25 % or less of the genuine substance.

THE MUSK TRADE IN INDIA

In India the use of musk in cosmetics has been replaced by synthetic alternatives which are much less expensive. The last known price of natural musk within the cosmetic industry is I.C. Rs 1,250 per 10 g as compared with synthetic musks which range from I.C. Rs 150 to 325 per kg (A. Sharma 1980, pers. comm.).

Ayurvedic and unani systems of indigenous medicine still rely on natural musk for many of their preparations. However, the amount is very small when compared with quantities formerly used. For example, a leading pharmacist in Allahabad used to purchase 150 kg per year for the preparation of 'bhasm' (ash), an ingredient of medicines (A. Sharma 1980, pers. comm.). As mentioned earlier, a U.P. state pharmacy purchases, on average, 0.5 kg musk annually (Table 4) via non-government channels. In Hardwar, Uttar Pradesh, one pharmacist handles 1-2 kg musk per year, all of which probably originates from the Garhwal Himalaya. One source suggests that 10-15 kg musk is used annually within India for medicinal purposes. This estimate may be too low.

INTERNATIONAL TRADING IN HIMALAYAN MUSK DURING THE LAST CENTURY

The international trade requirement for Himalayan musk is 1,000 kg per year, according to Gamwal (1977), but no justification for this figure is given. Such an estimate seems excessive in the light of annual export and import figures for musk (Table 5). Before World War II it is unlikely that France and U.K., among the principal European importers of musk, purchased more than 500-600 kg per year. Subsequently, in the post-war years, imports of musk to these two countries fell to about 200 kg per year (Table 5). It should be noted that Matheson (1950) does not give the origin of the musk, so it may not be exclusively Himalayan.

Table: 5 Quantities of Himalayan musk annually exported and imported during the last century

Period	Exporting country	Importing country	Musk kg/yr	Reference
1850-62	?	U.K.	266.49	Matheson 1950
1878-88	India	U.K. etc.	125.29	Chopra et al 1958
1948	?	U.K.	42.53	Matheson 1950
>1948	?	U.K.	<59.54	Matheson 1950
pre1948	?	France	250-300	Matheson 1950
1948	?	France	100	Matheson 1950
>1948	?	France	100-150	Matheson 1950
1960	Himalaya	Worldwide	c800	unofficial 1980
1970	Himalaya	Worldwide	c400	unofficial 1980
1972-73	Nepal	2.2% France 34.4% H. Kong 62.6% Japan 0.8% S.Korea	116.64	Blower 1974
Post-prohibition of the musk trade in India and Nepal				
1976	Nepal	Japan	179.00	Wildlife Trade Monitoring Unit
1980	Himalaya	Worldwide	≤200	unofficial 1980

Based on unofficial sources, the international trade in Himalayan musk has fallen from about 800 kg in 1960 to less than 200 kg in 1980 (Table 5). Nowadays, about 150 kg musk is imported annually by Japan for use in medicines and 20-40 kg by European countries for use in cosmetics. About 3 % of [illegible] imports are subsequently re-exported to U.S.A. but not as the raw material. [illegible] France one perfumer uses about 5 kg and another 2½ kg annually.

[illegible] centre of the traffic, from where musk is routed to Europe [illegible]. Probably all musk originating from Nepal, Sikkim and Bhutan is exported via Kathmandu; musk obtained from N. India is exported via [illegible] Calcutta and Delhi.

In the international market the price of musk rose to a peak value of U.S. $ [illegible] per kg in Hong Kong but at the end of 1979 dropped to [illegible] $ 40,000. The fall in price followed overstocking by Japan which, it is rumoured, [illegible] to buy musk for up to seven years. Although [illegible] become a party to the Convention on International Trade in Endangered Species of Wild [illegible] (Washington, August 1980), the Himalayan musk deer is exempt from [illegible].

EFFECTS OF HUNTING ON MUSK DEER POPULATIONS IN THE HIMALAYA

Only at 30 m or less is it possible to differentiate between the sexes of musk deer, based on the elongate superior canines (tusks) of the male which project below the lower jaw. Therefore females, as well as juveniles, tend to be shot along with males. All other hunting methods (i.e. trapping) are completely indiscriminate of the animal's sex and age. The higher proportion of males killed when guns are used (4 males per 10 musk deer) as compared with trapping (1 male per 4 musk deer)provides some evidence that the former hunting method is slightly discriminative of sex and age. Local information confirms the fact that females and juveniles are not shot if they are recognised in time.

A further reason for trapping being the more insidious method of hunting relates to the high density and semi-permanent nature of the traps. The resident population of musk deer within an area that is set with traps is unlikely to survive for more than two or three years. By contrast, hunting with guns is less intensive because inevitably a few animals will escape the attentions of the marksmen. Due to severe hunting pressures, musk deer populations are likely to be at or near their maximum breeding capacity, with females reproducing in their first year [illegible].

As the size of the Himalayan musk deer population has not been estimated, it is not possible to determine the proportion killed annually by hunting. However, an annual slaughter of 8,000 male animals would account for the present international trade in Himalayan musk (200 kg per year), based on an average pod weight of 25 g. The total number of musk deer killed is estimated to be 20,000-32,000 per year, depending on the relative extent to which shooting and trapping methods of hunting are practised. To this estimate should be added a minimum of 1,500-2,400 [illegible] to account for the annual consumption of musk in India (c. 1½ k per year). Previously, Harris (1962) estimated that 100,000 animals, [illegible] females and juveniles, were killed annually for the musk trade.

CONSERVATION

In India the Himalayan musk deer is completely protected under the Wild Life Protection Act, 1972. In Nepal the legal export of musk ended in 1973 after the introduction of the National Parks and Wildlife Conservation Act. Moreover, international trade in Himalayan musk is prohibited in accordance with CITES regulations. Therefore any trade in Himalayan musk, whether at national or international level, is illegal.

European perfumers forecast that musk will cease to be used in cosmetics within the next decade, due to its increasing expense and the difficulties of obtaining the commodity in unadulterated form. However, it is unlikely that the demand for musk will subside because its highly valued curative properties are deeply entrenched within indigenous systems of medicine. Thus, future conservation of the Himalayan musk deer will largely depend on controlling the musk trade (Green and Singh in press), presently estimated to be worth U.S. $ 8-10 million per year at the international level.

The status of the northern species of Moschus is not 'threatened' and so trade in musk originating from China and Russia is authorized under licence. Possibly, the legal export of Chinese and Russian musk, via Hong Kong, provides a loop-hole whereby Himalayan musk, smuggled into Hong Kong, can be re-exported to Europe under the guise of having originated from China or Russia.

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ACKNOWLEDGEMENTS

WWF project 1422 is privileged to be based in the Kedarnath Sanctuary of Uttar Pradesh. Particular acknowledgement is due to the Government of India and the Wild Life Preservation Organisation, Lucknow, for their sanction and full support of the research programme.

Many people, some of whom remain anonymous, have contributed to the information presented in this report. Their help, expressed in terms of their time and efforts, is greatly appreciated.

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Appendix

CONCLUDING REMARKS

Much of the contemporary information presented in this report is unofficial because of the illicit nature of the trade in Himalayan musk. At present, legitimate international trade in wildlife products is controlled by the CITES secretariate. The Wildlife Trade Monitoring Unit, a specialist group of the Survival Service Commission of the IUCN, acts as a watch-dog mainly by checking official export and import figures which are submitted to CITES by member countries. Although a vital role, monitoring trade in wildlife products at official levels will not uncover smuggling rackets.

Himalayan musk is just one of many valuable wildlife products which are traded internationally on the black market. This traffic largely remains undetected and will only be controlled by co-ordinated action at an international level. Within the framework of the IUCN the establishment of an 'undercover' unit, specifically to detect and investigate such traffic, would seem to be merited.

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